

Court Street Bridge  
Court Street (Route 11), spanning the  
Black River  
Watertown  
Jefferson County  
New York

HAER No. NY-173

HAER  
NY,  
23-WATD,  
5-

PHOTOGRAPHS  
WRITTEN HISTORICAL DATA

HISTORIC AMERICAN ENGINEERING RECORD

COURT STREET BRIDGE

HAER NO. NY-173

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NY.  
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Location: Court Street (Route 11) spanning the Black River, River Street, and the now abandoned right-of-way of the New York Central Railroad tracks, City of Watertown, Jefferson County, New York.

UTM: N 4869920

E 426660

New York State Quad: Watertown.

Dates of

Construction: Construction begun 1918, completed 1921.

Present Owners: City of Watertown, New York.

Present Use: Vehicular and pedestrian bridge.

Significance: A highly unusual and visually dramatic example of a multi-level reinforced concrete viaduct using four span types: barrel arch, continuous girder, open spandrel arch, and deck slab bridges to cross a river, local street, and railroad tracks.

Project

Information: The documentation of the Court Street Bridge was prepared by the Historic American Engineering Record (HAER), National Park Service, during the Summer of 1987 for the New York State Historic Bridges Documentation Project. This project was sponsored by the New York State Department of Transportation and under the supervision of Eric DeLony, Chief & Principal Architect, HAER. This report was written by Charles Scott, with research assistance from Andrew Cole. When citing this report, please credit the Historic American Engineering Record and the authors.

The Court Street bridge in the City of Watertown, New York is really four very different, but connected bridge spans forming a viaduct across a river, a local street and adjacent property parallel to the river, and the right-of-way of the now abandoned tracks of the New York Central Railroad. The idea for this unique bridge was first introduced in 1907 and the bridge was constructed in 1921 as a combination bridge building and grade crossing elimination project.

The first bridge across the Black River at the present Court Street site was built in 1803. A wooden truss covered bridge with stone abutments replaced this first span sometime during the 1850's. In 1884, the Wrought Iron Bridge Company, Canton, Ohio, replaced the covered bridge with a 173.8 foot long single span, eleven panel, through truss iron bridge. The bridge had a 19 foot roadway and two five-foot sidewalks. In 1899 the bridge was overhauled and strengthened to accommodate a single street railway car track on the eastern (upstream) side. The Court Street bridge was one of three crossings of the Black River within the City of Watertown.

In 1907 the New York Central Railroad constructed a new freight station on the north side of the Black River. The new station dramatically altered commercial and industrial traffic patterns and produced an increase in the size, weight, and volume of traffic on both River and Court Streets. The inadequacy of the iron truss bridge required City Engineer Henry E. Baker to examine three options, rebuild the existing truss bridge, widen the bridge or build a new steel bridge. The city engineer required a bridge with a minimum 30 foot clear roadway and two 8 foot wide sidewalks. All designs were based upon the need to carry the two tracks and up to two thirty to forty ton cars of the Black River Traction Company, as well as the live load of the heavy city traffic across the bridge. The first proposal, to strengthen the existing trusses to carry heavier loads was deemed "impossible" after a detailed structural analysis revealed the need to increase the capacity of the existing trusses by 100 percent. This suggestion was followed by a proposal to widen the existing bridge to thirty feet by lengthening the floor beams and adding a third, heavier steel truss through the center of the widened span. This proposal was given serious consideration before being dismissed as uneconomical when compared to the cost and life-span of a new bridge with a paved road and concrete sidewalks rather than a timber deck. Designs prepared for a new bridge by the United Construction Company of Albany, New York, offered a number of variations of two-span deck or through plate girder and single span, riveted through truss bridges. In examining the costs of a new bridge estimates ranged from \$14,000 to \$28,000 for bridges from 15 to 30 feet wide, with enlarged stone masonry abutments estimated at \$7,200 and a center pier at \$8,500.

The first suggestion for a concrete arch bridge was made in late 1907. City engineer Baker, "very much impressed" by the design of the Concrete-Steel Engineering Company for the Jackson Street bridge, wrote to the company to ask "if in your judgement a concrete arch is feasible." The company responded with a blueprint of a single span bridge, remarking that the bridge was feasible, but cautioned that, "while such a bridge would look very impressive it would

probably cost a little more than a two span bridge." Although no action was taken, the city engineer reported that all of the members of the Board of Public Works felt "very favorably" toward a concrete arch bridge and seemed to prefer the "single span arch" design as "more satisfactory to everyone concerned." He questioned, however, how long it would take to construct a concrete bridge, fearing that it would require more time to construct a concrete arch than erect a steel through truss bridge.

The biggest impediment to the construction of a bridge at Court Street was the bonded debt capacity of the City of Watertown. State law limited bonded debt to ten percent of the current assessed valuation of taxable property. Watertown's limit in 1907 was approximately \$1,270,262, with outstanding debt of \$1,025,752 leaving approximately \$245,000 available for new bonds. With the need to pay for a new bridge with bonds and only \$245,000 available, the Court Street bridge competed with bond requests for school, fire station, and sewer construction. In spite of the problems in financing the bridge, Mayor Francis M. Hugo saw a new Court Street bridge as an important part of the effort to unify the north and south parts of the City and in his annual address to the public he made the construction of the bridge a priority of his administration.

One week after the Mayor's address, and shortly after receiving a petition signed by more than 300 residents requesting the construction of a new bridge to relieve the increasing congestion at the Court Street bridge, the Board of Public Works passed a resolution asking the Common Council to appropriate \$40,000 for a new Court Street bridge. The Council received this resolution and promptly referred it to the Committee on Public Works.

Despite the genuine need and general acceptance of the idea of a single span concrete arch design, persistent contention over the location and cost of the bridge prevented any action from being taken until November 1914 when the city engineer released the results of his survey of the traffic using the bridge. The survey found that an average of 150 vehicles per hour used the bridge, but that during some months as many as 300 vehicles, many with heavy loads, crossed the Black River at Court Street each hour. In addition to vehicles, an average of ten trolleys per hour used the single track laid on the bridge, but the electric street railway company was unable to use newer, larger, and heavier double truck cars across the bridge. His report concluded that the existing steel truss bridge was too small for the size and volume of the commercial traffic using it and that the bridge had insufficient capacity to withstand the heavy loads traveling across it. He recommended the replacement of the steel truss bridge by a double span concrete arch bridge with a 38 foot wide roadway and two trolley tracks. He estimated the cost of this project at approximately \$40,000.

Once again the idea for a new bridge became a point of civic pride and unity. Some public officials, including the Mayor, saw a new Court Street bridge unifying a city geographically divided by the Black River. The Mayor asserted that a new concrete bridge would "have the effect of bringing the two sides of the river closer together" and in an address before local business leaders he declared: "If Watertown is to grow and command the position in the

state to which it is entitled, it must not get away from the proposition which is fundamental that the Black River does not divide the north side of the river from the south...In order to have our greatest possible development, the two sides of the river must be united at every possible tie." Expressing his personal preference for a concrete bridge, he presented the city engineer's recommendation to the Common Council and indicated that the proposed double arch span could be built as the lower deck of a future double deck bridge carrying traffic over the railroad tracks. The local newspaper editorialized that the construction of a new Court Street bridge was an "imperative necessity" to avoid "the constant peril of a catastrophe." Responding to these demands, the City Council authorized a formal investigation into the existing bridge's condition and the designs for a new span.

On May 15, 1915 a new dimension to the Court Street bridge problem was added when the Council filed a petition with the Public Service Commission alleging that the Court Street crossing of the New York Central Railroad tracks was dangerous and that public safety required an order from the Commission that it be eliminated. The Court Street bridge construction project was now formally linked to a proposed elimination of a grade crossing. By obtaining an order from the New York State Public Service Commission authorizing the elimination of the Court Street grade crossing under Section 91 of the Railroad Law, the cost of the project would be shared by the City, the State, and the railroad, in this case the New York Central. On April 6, the Council passed a resolution calling for a public referendum to approve the spending of up to \$82,500 as the city's share for the construction of the double deck bridge crossing both the Black River and the New York Central Railroad tracks.

The special election, held on May 4, 1915, brought out 1,222 voters. By a 689 to 533 vote margin, the proposition to sell bridge bonds and proceed with construction was approved. The Watertown Daily Times editorialized: "While the double deck bridge at Court Street comes far from meeting with general approval yet the people have voted it at a fair election and the community will make the best of that decision and trust that it is for the best."

The Common Council authorized the sale of bonds at its next meeting. City Engineer Sayles said that as soon as a "suitable and artistic bridge of reinforced concrete" could be designed, he would begin negotiations with the railroad company and submit the plans to the Public Service Commission. In January of 1916, the Council instructed the city attorney to draft and submit to the local state representatives a bill appropriating the State of New York's share of the bridge and grade elimination costs. Not until June 6, 1916, however, did the City Council formally authorize the Board of Public Works to employ the services of a consulting engineer to meet with the Public Service Commission and the New York Central Railroad and prepare plans for a bridge crossing the Black River and the New York Central Railroad tracks.

On March 6, 1917 City Engineer Sayles met with the Public Service Commission to discuss the city's request for a grade crossing elimination order and examine possible specifications and costs of the project. The desire for a new bridge at the level of the existing roadway and the need to eliminate a

grade crossing yielded a design in which the two bridges would be built as one structure. The site of this crossing of the river and railroad tracks produced a proposal for a multi-level span, the upper deck providing a viaduct crossing of both river and railroad and the lower deck providing a crossing of the river, but allowing access to the public streets on the south side of the river running parallel to the railroad. The cost of the project was estimated at \$295,000, with \$260,000 for the viaduct and \$35,000 for the lower deck. Since the lower deck was not part of the grade elimination project its cost was to be borne entirely by the City. The grade crossing elimination costs would be apportioned fifty percent to the railroad, twenty-five percent to the state, and twenty-five percent to the city. The cost breakdown of the bridge was estimated to be:

Cost	North Approach	\$ 22,000
	South Approach	\$ 34,014
	Arches and Other Spans	<u>\$176,452</u>
	Subtotal	\$232,466
	Land and Damages	<u>\$ 62,600</u>
	Subtotal	\$295,066
	Lower Deck Paid by City	<u>\$-35,000</u>
	Total Cost to be Shared	\$260,000

  

Allocation	New York Central (50%)	\$130,000
	New York State (25%)	\$ 65,000
	City of Watertown (25%)	\$ 65,000

In April the Public Service Commission held public hearings in Watertown to discuss the city petition and possible alternative designs for the project. Included in the alternatives was a proposal to have the city build a single deck span across the Black River and then depress Court Street under the railroad tracks. This suggestion was resisted by the city and at the conclusion of the hearing the Public Service Commission declared that "under all circumstances the City's plan appears to be the most scientific and satisfactory method" for eliminating the grade crossing. The following month the Public Service Commission issued an order authorizing the elimination of the grade crossing by the construction of a double deck Court Street bridge. The city was now fully prepared to move forward with the project and authorized the Mayor to prepare for the sale of \$82,500 of bridge bonds and negotiate a final agreement with the New York Central Railroad for the specifications of the bridge and the exact apportionment of the costs of the project, subject to the approval of the Public Service Commission. A survey of the Court Street bridge and crossing of the New York Central tracks revealed the acute need for the grade elimination. An average of 811 vehicles, 2,543 pedestrians, and 63 trains crossed the intersection of street and railroad tracks each day.

The general design agreed upon during May 1917 included a concrete arch 90 feet between skewbacks with an intrados providing 22 feet of vertical clearance over the New York Central Railroad tracks. Two reinforced concrete arches, each 57 feet and 6 inches, would carry the viaduct across Newell Street. The Black River would be crossed by a single-span reinforced arch 210 feet long with two decks. The upper deck would carry traffic across both the river and the railroad tracks. The lower deck would substitute for the existing iron truss bridge and provide a crossing of the river and access to Newell and Rivers Streets. The northern most portion of the viaduct would consist of a series of short reinforced concrete spans and an earth filled approachway between concrete retaining walls. The upper deck of the viaduct would permit a 38 foot roadway and 7 foot sidewalks with molded concrete balustrade and carry the two tracks of the electric street railway. The lower deck would contain two 13 foot roads and two 4 foot sidewalks with a 5 foot wide enclosed pipe gallery running longitudinally between them through the center of the lower deck. The outbreak of World War I and the national demand for the cessation of non-essential construction activity forced a suspension of the project before final approval of the detailed plans and specifications for the bridge could be obtained from the Public Service Commission.

In 1919 the city renewed its efforts to obtain Public Service Commission approval to build the Court Street bridge. Site preparation had begun in 1917 when the city inventoried and assessed the value of the property to be acquired for the viaduct. In late 1918 and into early 1919 the City acquired and removed or demolished the buildings along Court Street standing in the path of the bridge and viaduct. The City officially filed final construction plans in May 1919, received approval from the Public Service Commission in June, and requested bids immediately thereafter. Bids were received and tabulated by the City and the Concrete-Steel Engineering Company, the consulting engineers, on July 18, 1919. Three bids were received:

Peckham Construction Company, Buffalo, New York	\$335,815.21
Walsh Construction, Davenport, Iowa	\$345,932.45
Scott Brothers, Rome, New York	\$388,495.05

The low bid was \$68,000 above the original estimates prepared by the Concrete-Steel Engineering Company in 1917. Despite this increase in cost City Engineer Sayles described all the bids as "favorable," given the forty-five percent increase in material costs attributable to the wartime induced cost inflation. Before the contract was awarded, the City returned to the Public Service Commission to petition for a revision in the cost-sharing arrangement originally negotiated with the New York Central Railroad in 1917. At a public hearing held on August 19, 1919 agreement was reached to allocate the increased costs among all three parties in the same percentage as the original estimate. With agreement reached, the contract was awarded to the Peckham Construction Company, Buffalo, New York on August 30. The contract signed by the Peckham Construction Company on September 15 stipulated that the bridge would be

completed within sixteen months, by January 15, 1921. The Concrete-Steel Engineering Company assigned Mark D. Ewell as the resident engineer responsible for supervising the work of the contractor.

Difficulties and delays were encountered almost from the outset of construction. Problems included high waters in the Black River, a scarcity of materials and the inability to have cement delivered in sufficient quantities and on the appropriate schedule, railroad strikes and a scarcity of railroad cars, labor shortages and strikes, and disagreements between the contractor and the supervising engineers as to the schedule and organization of the work. One of the first tasks was pouring the 22 foot deep abutments for the four arch rings spanning the river. In November the heavy timber falsework for the arch ring forms was under construction. The winter of 1919 was one of severe weather which impeded construction, and as the river thawed in the Spring of 1920, large chunks of ice constantly threatened the timber falsework.

By July 1920, two arch ribs had been poured and the forms for the other two constructed. Workmen were also constructing the forms for the abutments for the barrel arch over the railroad tracks. The supervising engineer, however, advised the contractor that he was "far behind" his projected schedule and encouraged the contractor to add a second shift if sufficient labor could now be found. At this time the crucial task of forming the remaining two arch rings of the river span was delayed by the difficulty of obtaining sufficient quantities of cement for concrete from the plant in Hudson, New York. In November 1920 the barrel arch over the New York Central Railroad tracks was poured, but thereafter very little work was undertaken. These frequent delays prompted the contractor to request an extension of time to complete the contract. In response to this request the supervising engineer drew up a revised schedule for completing the bridge by May 1, 1921.

In constructing the hangers supporting the lower deck a special technique was devised to compensate for differing moduli of elasticities between steel reinforcing and concrete. The journal Concrete described the procedure: "When the arch ribs were poured, wedged shaped openings were left at the points where the steel rods were hung to support the lower deck. After the lower deck was placed, the supports were removed, permitting these rods to be stressed with the entire dead load of the lower deck, thus taking the full deformation due to this dead load. Forms were then built around these hanger rods and the concrete poured, embedding them. Thus the only additional elongation of the steel which may be expected will come from live loads which will not be sufficient to cause any appreciable cracking in the concrete."

In June, as the bridge neared completion the city requested a change in the thickness of the concrete foundation beneath the brick pavement in the sections of the upper deck laid on top of earth fill. In these sections, the depth of the concrete was increased from five to seven inches and the city paid for this extra cost. By September 1 the bridge was ready for final details, including the nineteen light fixtures designed by the Concrete-Steel Engineering Co. and cast at the Jno. Williams Bronze Foundry in New York City. The light fixtures on the lower deck, however, were designed for efficiency not aesthetics.



The bridge opened to electric streetcar and pedestrian traffic in mid-August 1921 and to automobile traffic on October 1, 1921. The heavy volume of traffic necessitated the permanent stationing of a traffic officer on the north end of the bridge between the hours of 8 AM and 10 PM daily. The formal notice of completion was November 26 and Concrete-Steel Engineering Company advised the city to accept the bridge, which it did officially on November 28. The cast bronze nameplate was installed mid-January 1922 and reads:

City of Watertown  
1919-1921  
Court Street Bridge  
Watertown, New York  
Built Under the Administration of the  
Board of Public Works -- City Council  
1919 1921  
I. R. Breen, Mayor R. A. Cahill, Mayor  
W. P. Darby, President D. D. Kieff  
D. B. Armstrong R. S. George  
J. A. Van Deusen D. B. Armstrong  
R. H. Dodds W. H. Ayer  
E. D. Bellinger  
G. M. Getman, Supervisor C. A. Bingham, City Manager  
E. W. Sayles, City Engineer Paul B. Sutton, City Engineer  
In Cooperation with the  
New York Central Railroad, Saint Lawrence Division,  
State of New York Public Service Commission, 2nd District  
Designed and Erected under the Supervision of the  
Concrete Steel Engineering Co., Consulting Engineers, New York, N. Y.  
William Mueser, Supervising Engineer & Mark D. Ewell, Resident Engineer  
Construction Planned & Executed by the  
Peckham Construction Co., Inc., Contractors, Buffalo, N. Y.  
E. C. Boehm, Superintendent

The bridge that opened in 1922 consisted of eight spans of four span types forming a single 502-foot long viaduct. From south to north, the viaduct included an 86 foot barrel arch spanning the New York Central Railroad tracks, three 49 foot concrete tee beam girder spans crossing Newell and River Streets, a 195 foot double deck open spandrel reinforced concrete arch across the Black River, and three 15 foot concrete slab deck spans connecting the upper deck of the open spandrel arch to the approach at Main and LeRay Streets. The viaduct had an overall out-to-out width of 54 feet which permitted a four lane brick paved roadway with a curb to curb width of 38 feet and two 7 foot sidewalks with 3 feet 6 inch exterior parapet walls. The upper roadway ascended a 5.3 percent grade from the northern approach south to the crown of the barrel arch over the railroad tracks. From the crown of the barrel arch south to the southern approach at Massey Street the roadway descended on a 2 percent grade.

The barrel arch had a horizontal clearance of 40 feet and provided vertical clearance of 25 feet, 6 inches, and rose 11 feet from the spring line of the arch. The upper deck was carried on a cinder fill. The three concrete girder spans each measured 49 feet. The open spandrel arch carried an upper deck on open spandrel posts and a lower deck hung from the arch ribs by vertical hangers located 13 feet apart, center to center. From the spring line of the arch the four ribs rose 38 feet. The four main arch ribs were 6 feet wide and 5 feet deep and spaced to permit two 12 foot wide roadways. The lower deck had an out-to-out width of 61 feet, 6 inches. This width permitted two roadways with a vertical clearance of 13 feet, a wood sheathed pipe gallery located between the two center arch ribs running longitudinally and carrying an 8 and a 12 inch diameter water pipe, and two 4 foot wide sidewalks cantilevered on the outside elevations. The three deck slabs were each 13 feet long.

The Court Street bridge was one of 2,800 reinforced concrete arch bridges designed or supervised by William Mueser. Mueser was born in Germany in 1872 and emigrated to the United States in 1893. Between 1895 and 1900 he was associated with the Melan Arch Construction Company, initially as a designer and eventually as an owner of the company. He is credited with designing and supervising the construction of the first reinforced concrete arch bridge built in the United States, in Rock Rapids, Iowa in 1894. Mueser also designed the first reinforced concrete arch bridges built in New York, New Jersey, Pennsylvania, and the District of Columbia. In 1900 he formed the Concrete-Steel Engineering Company in partnership with Edwin Thacher. Thacher, like Mueser, specialized in reinforced concrete engineering and held a number of concrete arch and reinforcing system patents. After 1912 when Thacher retired from the firm and from active practice, Mueser became the sole owner of the Concrete-Steel Engineering Company. One of his most notable bridges is the Galveston Causeway, Texas. Mueser continued to manage the firm until 1933 when he dissolved the company and entered the employment of the Federal Civil Works Administration as a Regional Director. Before his death on August 4, 1950, Meuser obtained 50 patents pertaining to reinforced concrete construction including the "diamond" reinforcement bar still in use today. He was a member of both the American Society of Civil Engineers and the American Society of Materials Testing.

E. H. Harder, a structural engineer specializing in concrete and reinforced concrete construction, was another member of the Concrete-Steel Engineering Company team responsible for the design of the bridge. Two city engineers also played important roles in the building of the bridge. Earle Willoughby Sayles, the City Engineer of Watertown between 1909 and 1919, was a Watertown native, who had obtained his civil engineering education at Union College. He obtained experience with the New York State Engineer department and as a construction engineer, specialized in paper mill construction in northern New York. He was credited with building the first hollow reinforced concrete dam, located at Theresa, New York, in 1902. Sayles was an important force in the early efforts to have the Court Street bridge built. The city engineer in office during the construction of the bridge was Paul B. Sutton. Sutton had obtained his civil engineering education at Cornell University and served as city engineer from 1920 until 1930 when he was elevated to the position of city manager.

The Court Street bridge did link the City of Watertown and contribute to the economic and industrial growth of the city. Except for removing the electric street railway track on the upper deck, no major repairs were required until 1953. At this time the bridge underwent a major reconstruction which included the rebuilding of all expansion joints and the application of "gunnite" concrete to all spalling exterior surfaces. In 1981 the bridge was given a 15 ton load limit and the sidewalks closed because of serious deterioration.

Today the condition of the bridge varies from section to section. An inspection in 1984 by the New York State Department of Transportation showed that the barrel arch and the open spandrel arch ribs are in generally good condition. Elsewhere, between 35 and 50 percent of the underdeck surface area shows spalling and efflorescence. The spandrel columns and hangers are most deteriorated beneath the expansion joints. The three girder spans show major deterioration of the fascia beams supporting the sidewalks and parapet walls. Despite these surface and structural deficiencies, the state inspection of the bridge concluded: "In summary, based on the detailed field inspection and subsequent load rating analysis, the Court Street Bridge can be rehabilitated."

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